California Transmission Policy Suggestions To Facilitate Geothermal RPS Supplies

Workshop on Transmission Constraints To Geothermal Resource Development

California Energy Commission

April 11, 2005

Renewables Transmission Plan Contents

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Section 1

Geothermal Industry Today

VULCAN POWER COMPANY

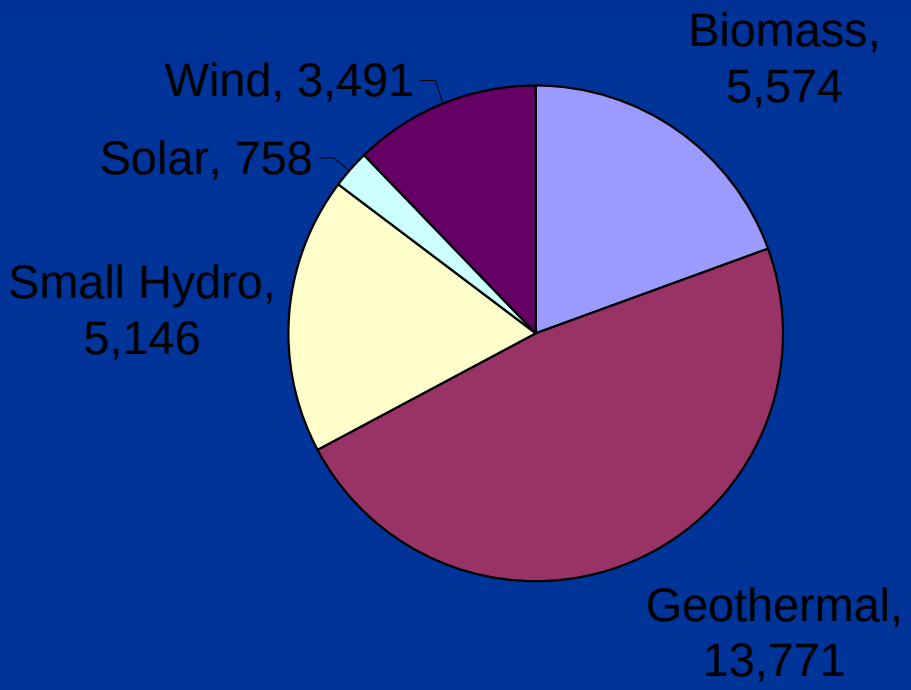
Geothermal Industry

- Geothermal technology is proven
- Baseload power (24 x 7)
- 2,800 MW United States, Largest non hydro renewable west of Mississippi. Equal to about 7,600 MW of wind.
- Over 8,500 MW worldwide
- Geothermal provides about 6% Of California supply, Largest non hydro renewable supply

Vulcan partner Tony Bingham, former president of codeveloper of this $550 million, 270 MW plant Coso, CA. Note three 30 MW unit plant layout. Significant follow-on cost/expense savings.

Geothermal: California and Nation

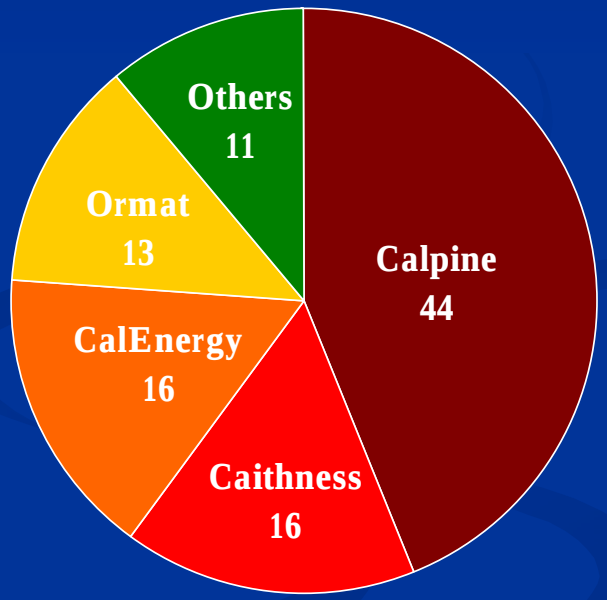
California Renewables (GWh)



Per Geothermal Energy Association

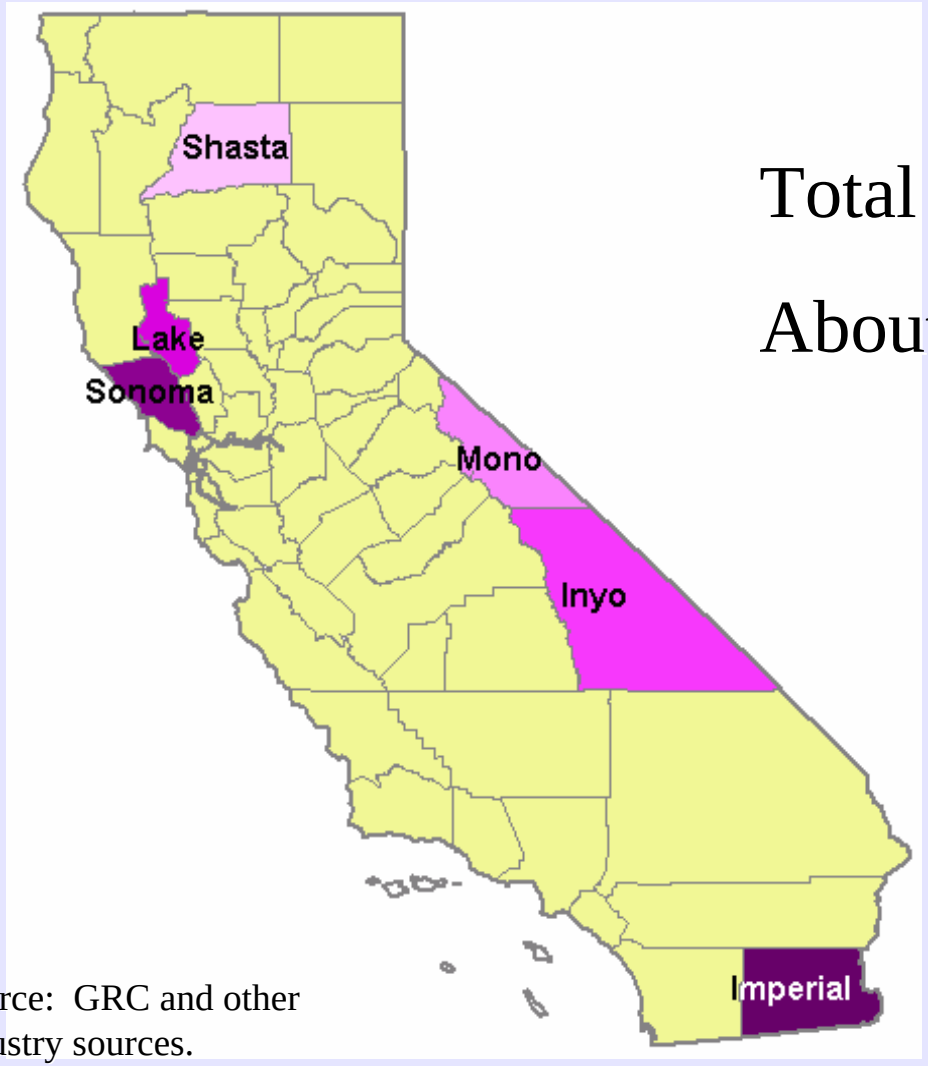
Geothermal Competitors

% of American Geo Output



Per Enel 3/05 PowerGen Renew Conf

Developed Geothermal Power I California



Total Developed: 1,673 MW

About 20% World Capacity

- 2 MW
- 34 MW
- 250MW
- 338 MW
- 512 MW
- 537 MW

Source: GRC and other industry sources.

CALENERGY OPERATING CORPORATION

Section 2

New Geothermal Supplies For California

California
Nevada
Oregon

California RPS Law: SB 1078

Legislative Intent: Diversified Resource Types and Locations

"Plan submitted by electrical corporation shall include:"

1.) "Optimal mix of renewable generation resources…"
range of deliverability characteristics

2.) "Bid setting forth need for…each deliverability characteristic…location preferences if any."

3.) "May give preference to projects with benefits to communities with plurality of…low income populations"

Legislative intent developed through two legislative sessions and numerous comments on the record from bipartisan legislative leadership from Siskiyou-Shasta Counties in the North to Imperial County in the South. The legislature wanted and expected diversified new renewable power projects with:

1.) Resource diversity: Geothermal, biomass, wind and solar
2.) Location diversity: Northern, Southern and Central counties
3.) Preferably new jobs in distressed rural areas and new tax base

Resource Diversification Policy Decision 1.
GAS FIRED and Geothermal Baseload Policy Issues:

1. RPS requires 20% renewables and sets up MPR payments.
2. Geothermal and biomass only major baseload offset for gas
3. At $7.50/mbtu Henry Hub 4/7/05 gas is up $1.73/mbtu over year ago prices and NYMEX three year strip prices average over $7.00/mbtu.
4. This translates into delivered new California gas over $8.00/mbtu next 3 years plus future not looking any better.
5. Read last gas supply and price reports of Houston oil/gas banker Simmons and Company International (www.simmonsco-intl.com). LNG supply and price problems means it will be “price taker” not “price setter” and multiple LNG and Arctic lines are years away.
6. Consider implications of probable 2006 MPR price above $0.07 per kWh.
7. Set policies NOW to support at least 1,350 MW new geothermal for California startups from 2007 thru 2011. Add 1,560 MW geothermal if 33% RPS passes. (See Chart, This Section)

Renewable Transmission Plan: Geothermal California Diversified Supply Map

New Geothermal Development Opportunities in California

Source: Industry estimates

Total Future Potential: 3,465 MW

- 60 MW
- 185 MW
- 200 MW
- 220 MW
- 500 MW
- 2,300 MW

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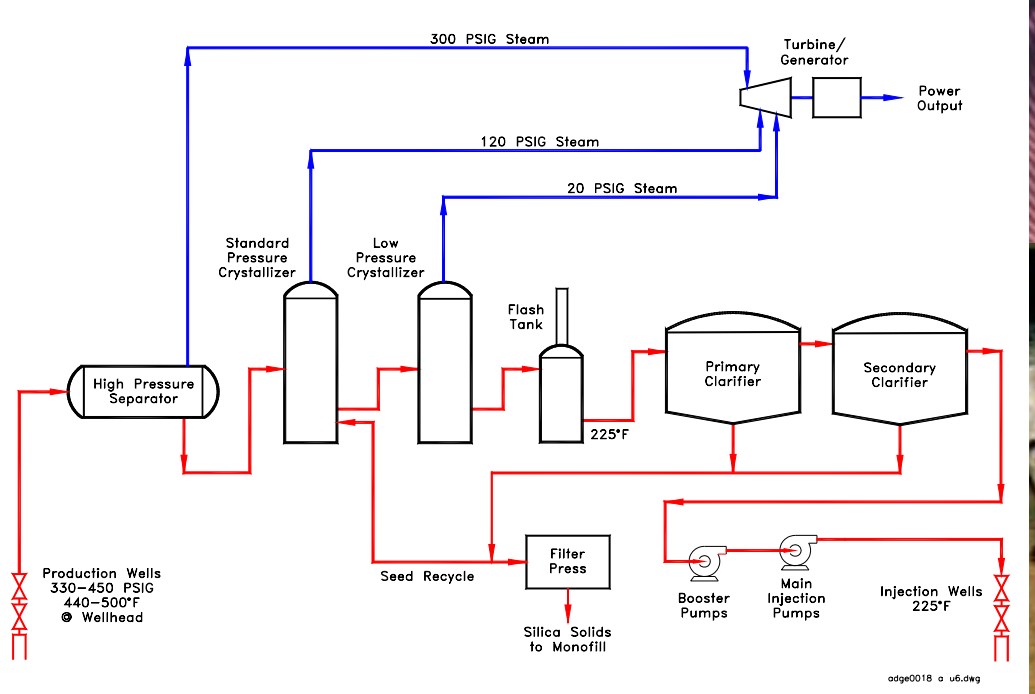
A Geothermal Diversification Policy Driver

Consider 2005 PPAs, cost, resource-type issues, if any. Do not rely solely on high-brine projects from Imperial Valley. Mix of NorCal, SoCal, Nevada and Oregon resources optimum policy choice.

Slide 1 (1) :



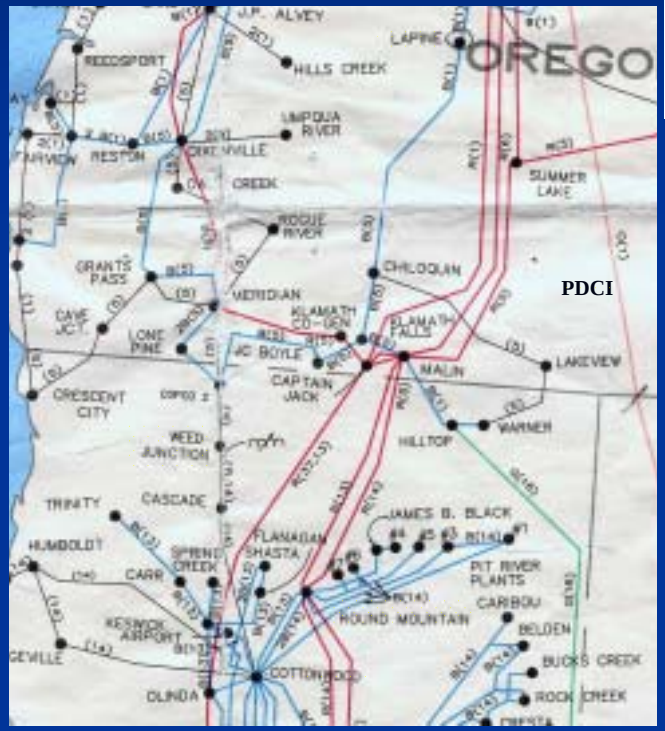
Slide 2 (1): Salton Sea Field, Imperial Valley, CA
Severe scaling from hot geothermal brine flow

Slide 3 (1): Severe corrosion from hot geothermal brine flow though carbon steel pipe.

(1) Source: CalEnergy Operating Corp (3 Slides)
PowerGen Renewables Conference 3/05

Renewable Transmission Plan: Geothermal Neighbor State Supply Map (1,730 MW)

WSCC Grid: Round Mtn to LaPine, Ore



North of Lugo	MW
Mammoth Phase III Nevada Phase III	60 (?) 285
To 345 MW	345 MW

LaPine Sub

Oregon 600 F Newberry Volcano
To 730 MW

California Oregon Intertie (COI)
4,800 MW

COI Subs

Oregon

Calif.

CAISO Control (?)

Weed Sub
PacifiCorp(?)

PacifiCorp (?)

Round Mtn
Substation

Pacific DC Intertie 3,100 MW
(LADWP and SCE)
To Sylmar, LA

CAISO Stated Area Boundary?

Does CPUC-CEC-CAISO jurisdiction extend over PacifiCorp and PG&E lines to Oregon border?

What control-influence over COI use by Cal utilities?

Nevada Developers
Up To 1,000 MW

Aurora Site PDCI Green Tap
500 To 1,000 MW

Agency Resource Diversification Policy Should and Will Drive California Transmission Policy: Geothermal Diversification

Suggestion 1: Set in-state and neighbor state geothermal transmission support plans in three phases:

Phase (1) Signed California PPAs thru Q3, 2005;

Phase (2) Signed California PPAs thru 12/31/06, both groups to be online by 2011 accelerated RPS date; and

Phase (3) Transmission upgrades for 2011-2020 projects if 33% RPS passes.

Suggestion 2: Set Imperial County geothermal transmission at phase 1 level (____(?) MW)[1] thru 2011 based upon THIS diversified geothermal plan and with Imperial Working Group and the Regional Geothermal Working Group input thru Q2, 2005.

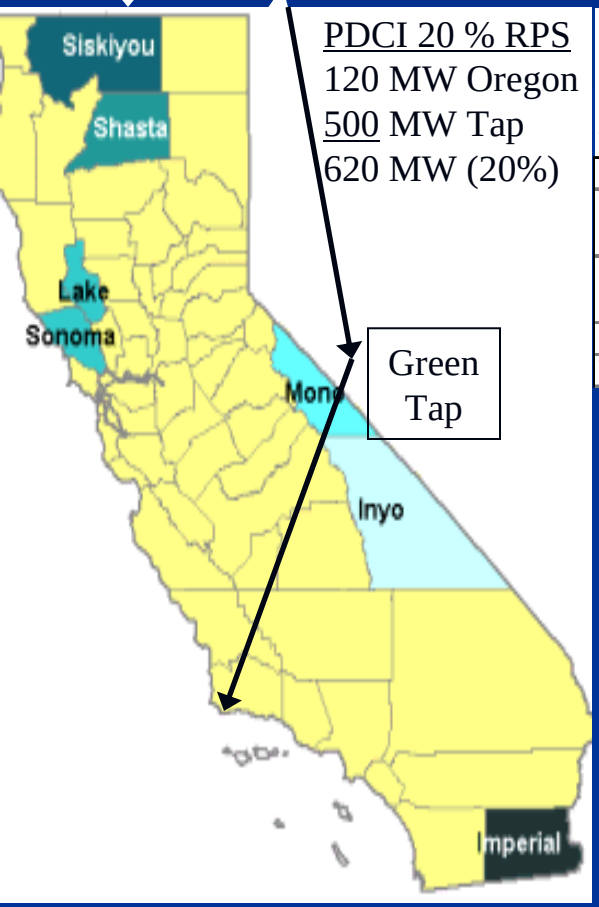
Note: (1) Appropriate Imperial Valley Phase I new line size is policy decision still to be made. Perhaps 360 MW thru 2011, based on some 2004 contract comments by Imperial developers.

Renewable Transmission Plan: Geothermal
Suggested Geothermal Supply Plans: RPS 20% and 33%

Oregon

COI:
10% = 480 MW
20% = 960 MW

PDCI 20 % RPS
120 MW Oregon
500 MW Tap
620 MW (20%)



Green Tap

Timeframe	Estimated Contracts Needing Transmission Support							
	California Counties				Neighbor States			
	Lake and Sanoma	Mono and Inyo	Imperial	Siskiyou and Shasta	Central Nevada	Oregon	Northern Nevada	Total
Current (MW)	850	238	537	2	180	0	3	1,810
RPS 20% 2006-2011	150	60	360	240	360 (1)	120	60	1,350
New RPS 33% 2011-2020	0	60	480	240	360	360	60	1,560
New Total (To 2020)	150	120	840	480	720	480	120	2,910
TOTAL Geo	1,000	358	1,377	482	900	480	123	4,720

Renewable Transmission Plan: Geothermal
Suggested Geothermal Supply Plans: RPS 20% and 33%

	Estimated Contracts Needing Transmission Support							
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Timeframe	Lake and Sanoma	Mono and Inyo	Imperial	Siskiyou and Shasta	Central Nevada	Oregon	Northern Nevada	Total
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New Total (To 2020)	150	120	840	480	720	480	120	2,910
TOTAL Geo	1,000	358	1,377	482	900	480	123	4,720
Note: (1) Could include forest thinning biomass and wind for total 500 MW.								

Transmission Cost Comparison
Known Wind and Regional Geothermal Projects

Project Name	Power Type	Dollars in Millions				Capacity (%)	Cost Per Avg MW
		Projects		Cumulative			
		Cost	MW	Cost	MW		
1. Techachapi:							
Phase 1	Wind	$207	700	$207	700	35%	$845,000
Phase 2	Wind	$281	900	$488	1600	35%	$871,000
Phase 3	Wind	$66	750	$554	2350	35%	$674,000
2. North of Cottonwood:							
Phase 1	Geo	$1	45	$1	45	95%	$22,200
Phase 2	Geo	$45	240	$45	240	95%	$197,400
3. North of Lugo:							
Phase 1	Geo	$2.5	60	$2.5	60	95%	$43,900
Phase 2 (1)	Geo	$328	345	$328	345	95%	$1,000,000
PDCI Tap:							
Phase 3A	Geo	$100	500	$100	500	95%	$210,000
Phase 3B	Geo	$50 (est)	500	$150	1000	95%	$158,000
Note: (1) May be able to stage 150 MW at much lower cost.							

Transmission Cost Comparison
Known Wind and Regional Geothermal Projects

Project Name	Power Type	Dollars in Millions				Capacity (%)	Cost Per Avg MW
		Projects		Cumulative			
		Cost	MW	Cost	MW		
4. North of Round Mountain:							
Phase I: COI Renewable Operating Loading Order Ruling							
Newberry, OR	Geo	$0	120	$0	120	95%	$0
Glass Mtn, CA	Geo	$0	120	$0	120	95%	$0
Surp Val, CA	Geo	$0	20	$0	20	95%	$0
subtotal			260		260		
Phase II: COI Renewables Operating Loading Order Ruling							
Oregon	Geo	$0	360	$0	360	95%	$0
Glass Mtn	Geo	$0	120	$0	120	95%	$0
subtotal			480		480		
TOTAL I and II			740		740		
Phase III: PDCI LaPine to Celilo to Sylmar, LADWP Contract Execution							
Newberry, OR	Geo	$0	90	$0	90	95%	$0
5. Imperial Valley:							
Phase I	Geo	?	?	?	?	95%	?
Phase II	Geo	?	?	?	?	95%	?

Section 3

The Company

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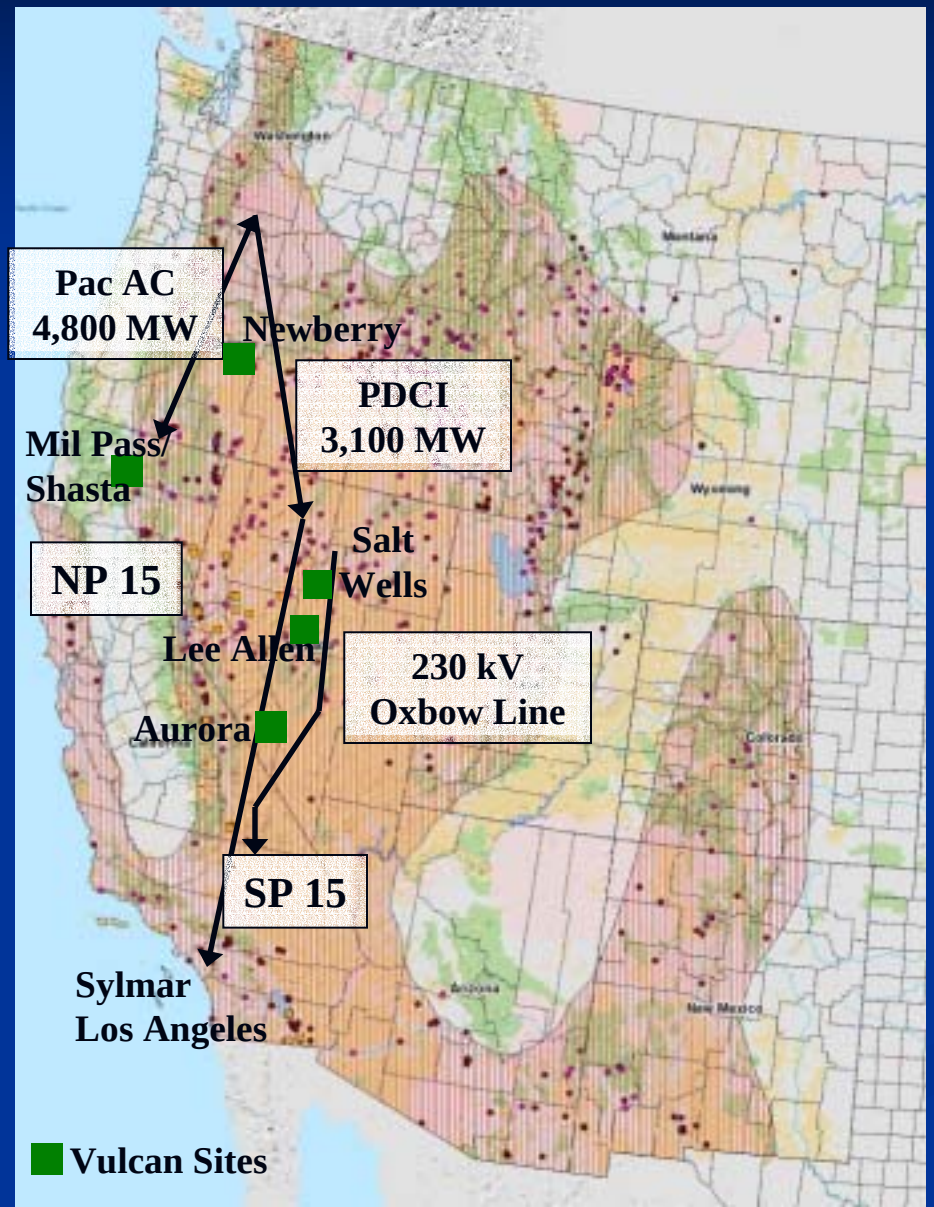
Projects and Markets

(At 4/11/05)

- Largest geothermal property position in America: 145,620 acres.
- Advanced properties up to 1,000 MW. Equal to about 3,000 MW of wind average annual output.
- Sites in California, Nevada and Oregon can serve California.
- Geothermal growing again.
- Strong interest from financial markets, good projects with PPAs will get funded, both larger companies and smaller.

California Properties and Nevada and Oregon Imports

Western Geothermal Resources



Dixie Valley, Nevada
Steam Flash Plant

55 MW to SCE
15 Years Baseload Supply

Vulcan 50,000 Acres Nevada
Similar To Dixie Valley
Closer To California

Company Overview

Unique 15 Year Old Geothermal Company

- Mgmt Team: Owners/Executives over 700 MW Geothermal Developed
- Geo Properties: Largest In The Nation 145,620 Acres
- Market Creation: A leader in passage of 4,000 MW RPS Laws
- New PPA Contracts: 120 MW Executed and 330 MW In Process
  450 MW Buildout to 2011 With Investors/Partners
  Processing 11% RPS market share
- Project Partners: Hiram "Tony" Bingham/Energy Investors Fund Grp
  Other entities seeking participation
- Financing: $ 150 Million Equity Term Sheets In Negotiation
  Private Equity and Project Equity Funds

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Project Mgmt Team

Bill Pons	Director	Bechtel Power Plants, 29 Years
Roger Rynearson	COO	PG&E and NCPA Geothermal Development and Ops, 31 Years
Global Power Solutions	Consultants	Plant Design, Retrofit Former Coso, Stone and Webster
TIC	EPC Contractor	Likely Project Contractor
<u>Project Mgmt Parties:</u>		
Tony Bingham	Shareholder	Project Investor/Partner
Energy Investors Fund Grp	Project Equity	Joint Venturer (Two 120 MW Projects) Others Are Seeking Involvement
<u>Geothermal Scientists (3 of 5):</u>		
Paul Brophy	Consultant	Incoming GRC President Former Coso Geologist Military Pass Exploration Leader
Al Waibel	Consultant	Newberry Geologist, 15 Years Many Nevada Projects
Dr. Jim Combs, PhD	Consultant	MIT Trained 30 Years in Geo Experience Many Projects From Newberry, OR to Basin and Range

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Development Focus

1. Supply California utilities from 120,000 acres of geothermal properties in California, Nevada and Oregon.
2. Low cost, high efficiency standardized multi-unit water cooled double flash steam plants on advanced 50,000 acre Nevada properties from 5,000 – 7,000 foot resources @ 370°F to 450°F.
3. Adapt cost effective steam flash design to measured 600°F 40,000 acre Newberry Volcano, Oregon project rated 730 MW heat content by USGS. Supply California and Northwest.
4. Incorporate steam flash design into state-of-the-art air cooled combined cycle plants on estimated 500°F to 600°F Military Pass-Shasta, CA project rated 2,100 MW heat content by USGS.
5. Supply other utilities in Nevada and Northwest.

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Sections 4- 6

Three Regional Geothermal Transmission Projects

North of Lugo
North of Cottonwood
North of Round Mountain

Transmission Constraint Removal Law: AB 970

"The Purpose…is to provide balanced response to electricity problems facing state that will result in significant new investments in new, environmentally superior electricity generation."

Unfortunately today, to the best of our teams knowledge, three years after passage, we are still a long way from providing a: "Balanced response to electricity problems that will result in significant new investments in new" renewable power. Adding pressure to the law, North American gas basins are in decline, gas fuel prices are now $7.50/mbtu and gas three year strip prices are over $7.00/mbtu. The 2006 MPR may be over $0.07/kWh.

We must get moving now on a broader front than one wind and one recent geothermal working group least we subvert new 2007-2008 projects at multiple sites. We appreciate CEC willingness and leadership to address and remedy this rather obvious shortfall.

Regional Geothermal Working Group Transmission Policy Request

1. CEC and CPUC and CAISO staff join geothermal developers in Regional Geothermal Transmission Working Group along with SCE, PG&E, PacifiCorp and LADWP. If PacifiCorp absent, issue agency order to join. If LADWP absent, agencies send request to Los Angeles mayor and chairman and vice chairman of LADWP council and/or media. (See handout.)

2. Purpose of working group: includes three existing regional transmission upgrade projects for evaluation and staffing to agency leadership for policy determination by 9/31/05. Known long-existing constraints include: North of Lugo, Cottonwood and Round Mountain. Includes policies dealing with CAISO boundaries, COI use and PDCI use issues.

Resource Diversification Policy Will/Should Drive California Transmission Policy

Time is Wasting: Make Following "Big Picture" Resource and Transmission Diversification Decisions, Q3 2005 (Latest)

Suggestion 1: Set regional geothermal supply targets by county as elsewhere described herein and establish transmission plans to support each resource area by 9/30/05.

Suggestion 2: Implement COI priority renewable operation loading order geothermal transmission plan with appropriate California multi-agency plans, hearings, rules: CEC, CPUC and CAISO.

Suggestion 3: Stop Sempra 1,450 MW coal plant on Cal-Nev border thru policy statements and/or rulings. Policy reasons follow in Section 7. Support PDCI "Green Tap" plan on Aurora geothermal site (500 MW-1,000 MW). See Vulcan plan map below.

Suggestion 4: Assist at legislative level to increase CAISO technical process staff size, if not already underway.

Renewables Transmission Policy Request
Project Financing Suggestions

1. Vulcan project partner helped finance Path 15 upgrade.
2. Evaluate at least two geothermal working group recommendations.
3. Include financing plan for Phase I transmission upgrades by 9/30/05 for 2007/2008 projects.
4. IOUs participating in RPS logical source of funding depending on SCE-FERC ruling. If not successful, authorize-establish 3rd party projects like Path 15.
5. Given LADWP intransigence to date, consider authorizing-supporting special PDCI Green Tap Finance Authority. If necessary to have agencies support Green Tap, could be located just inside California border on PDCI ROW – public land.

California Transmission Policy On 7,900 MW Interties Increased NW Demand and Reduced Hydro Output Impacts

1. How much of 4,800 MW COI AC lines into NP15 should be devoted to new California renewables?
    a) 120 MW near-term PPA only?
    b) 240 MW to 1,000 MW with other PPAs?
    c) 10% = 480 MW
    d) 20% = 960 MW

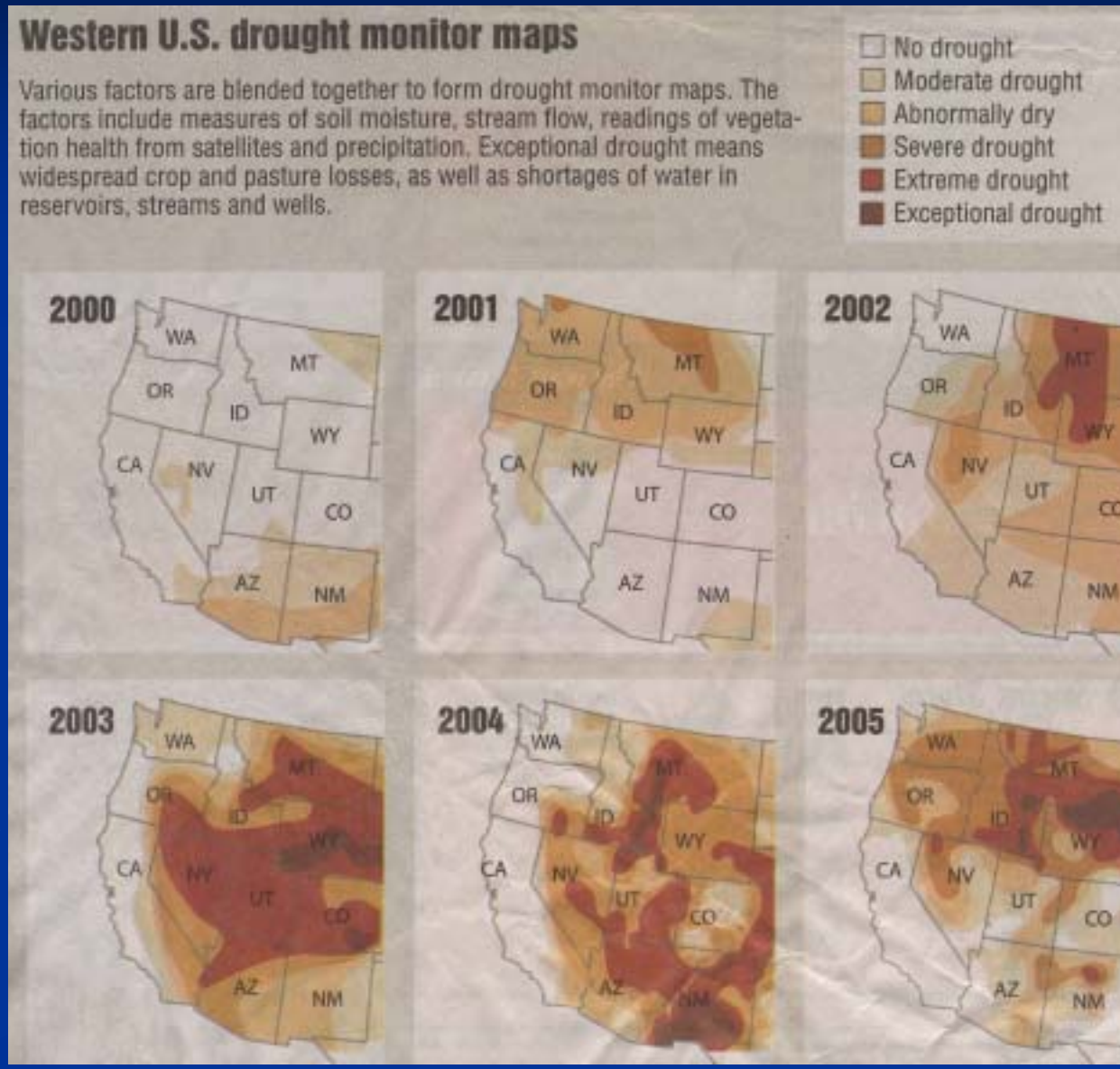
2. How much of 3,100 MW Pacific DC Intertie should be devoted to new California renewables?
    a) Zero, give capacity to Sempra coal project (1,450 MW, 47%)
    b) 2008-2009 timeframe: 500 MW at Aurora, Nevada Green Tap and 120 MW from NW via Celilo delivery (620 MW = 20%)
    c) 2011-2012 timeframe: 1,000 MW at Aurora Green Tap.

California Transmission Policy Issue

NW Hydro Droughts: 88% Bad Droughts (5 of 6 years)

"What's normal" hydro year asks Portland General Electric!

In 2001, the "abnormal" NW drought caused a loss of 4,000 MW. There have been "abnormal to severe" droughts in NW hydro supply areas five of the last six years. Utility execs say more power from higher price sources like gas. PacifiCorp announced gas-fired generation costs up sharply, 30% above a year ago. Reports of much less "spill" hydro for California like the power crisis years.



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Sections 4

North of Lugo/PDCI Regional Transmission Upgrade Project

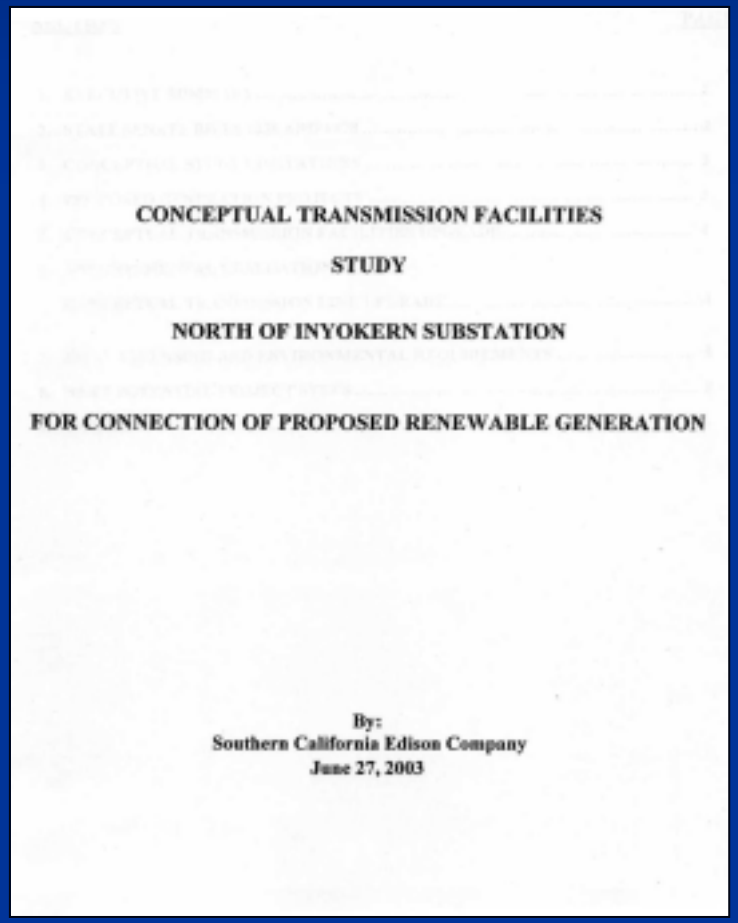
Phase I: Vulcan Nevada-SCE PPA (60 MW)

Phase II: North of Lugo Stages (To 345 MW)

Phase III: PDCI Aurora Green Tap (500-1,000 MW)

North of Lugo Project: Phase I (60 MW)
Vulcan Project To Control Sub

SCE Concept Study
For Vulcan (6/27/03)



CONCEPTUAL TRANSMISSION FACILITIES

STUDY

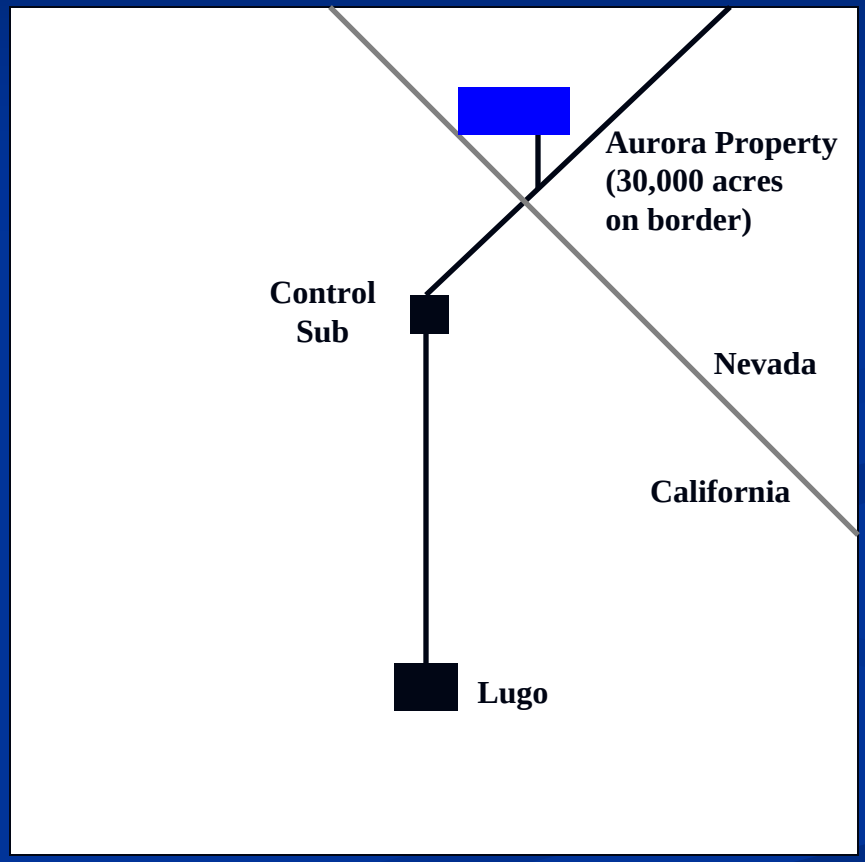
NORTH OF INYOKERN SUBSTATION

FOR CONNECTION OF PROPOSED RENEWABLE GENERATION

By:
Southern California Edison Company
June 27, 2003

Study results applicable to phase II. Not to Phase I.

Est. max grid cost: $2.5 million



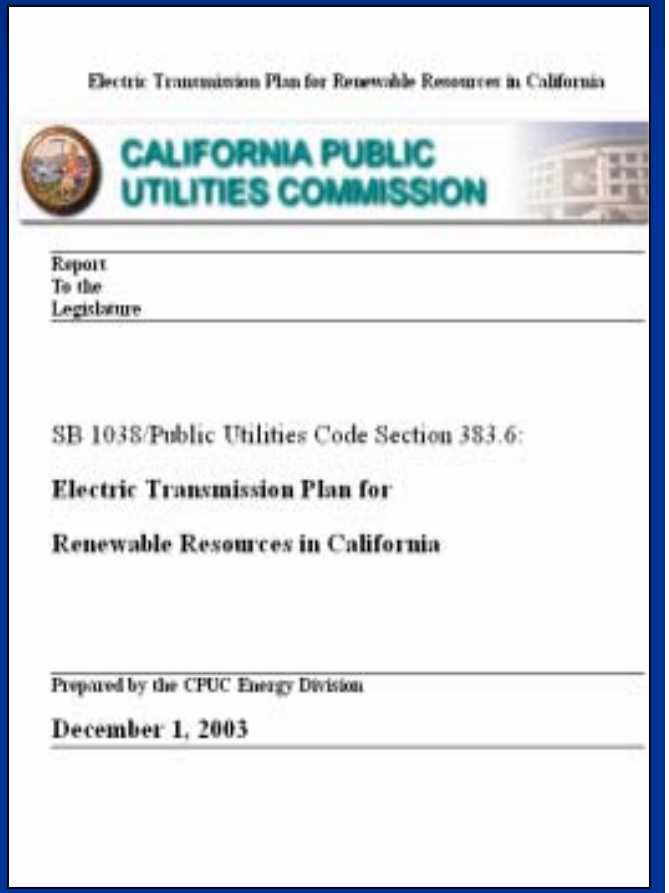
Phase I max cost @ 95% capacity is $43,900 per avg MW.

This Project executed PPA With SCE:
30 MW
Expandable to 120 MW

Low congestion study: RW Beck.
SIS filed with CAISO/SCE.
Project in transmission queue.

North of Lugo Project: Phase II
Multiple Developers To Control Sub: (To 345 MW)

Note: May skip phase II and go directly to Phase III.


Electric Transmission Plan for Renewable Resources in California

CALIFORNIA PUBLIC UTILITIES COMMISSION

Report
To the
Legislature

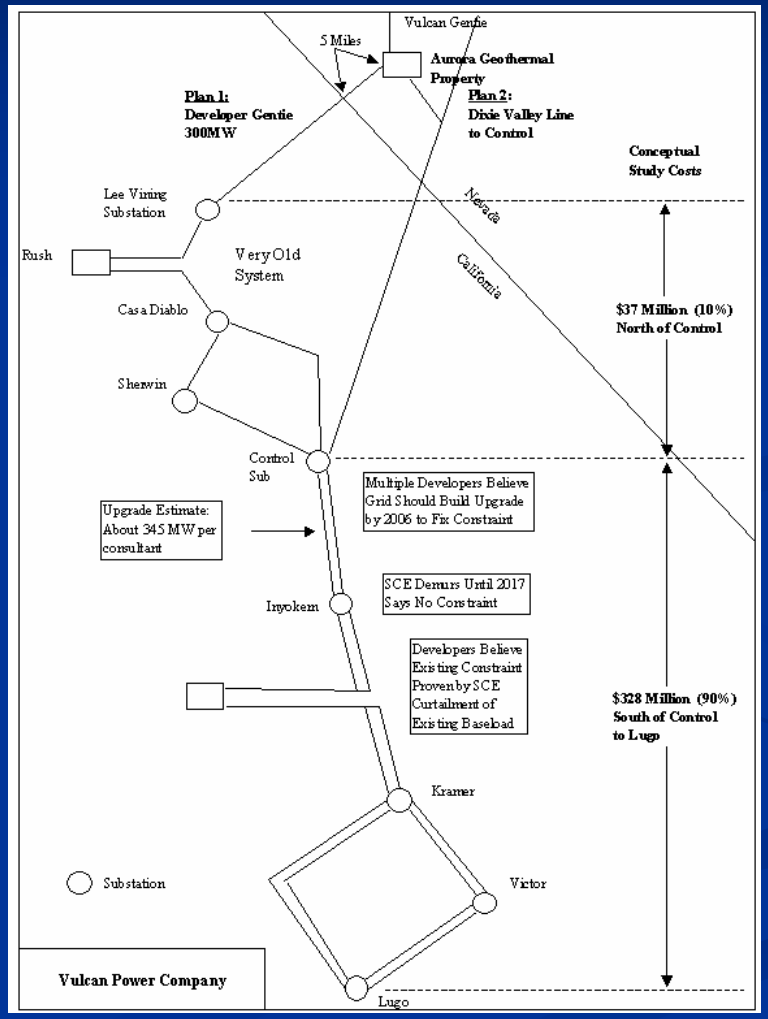
SB 1038/Public Utilities Code Section 383.6:

Electric Transmission Plan for

Renewable Resources in California

Prepared by the CPUC Energy Division

December 1, 2003



Simplified Summary of SCE concept study results in Cal Renewables Transmission Plan

Study Results

Est cost of max output of North of Lugo upgrade is $328 million for 345 MW. At 95% capacity equals $1 million per avg MW.

Verbal Comments

Detailed SIS may find upgrade/mgmt designs to stage project adding 150 MW (+) initially at considerably lower cost.

Next Steps

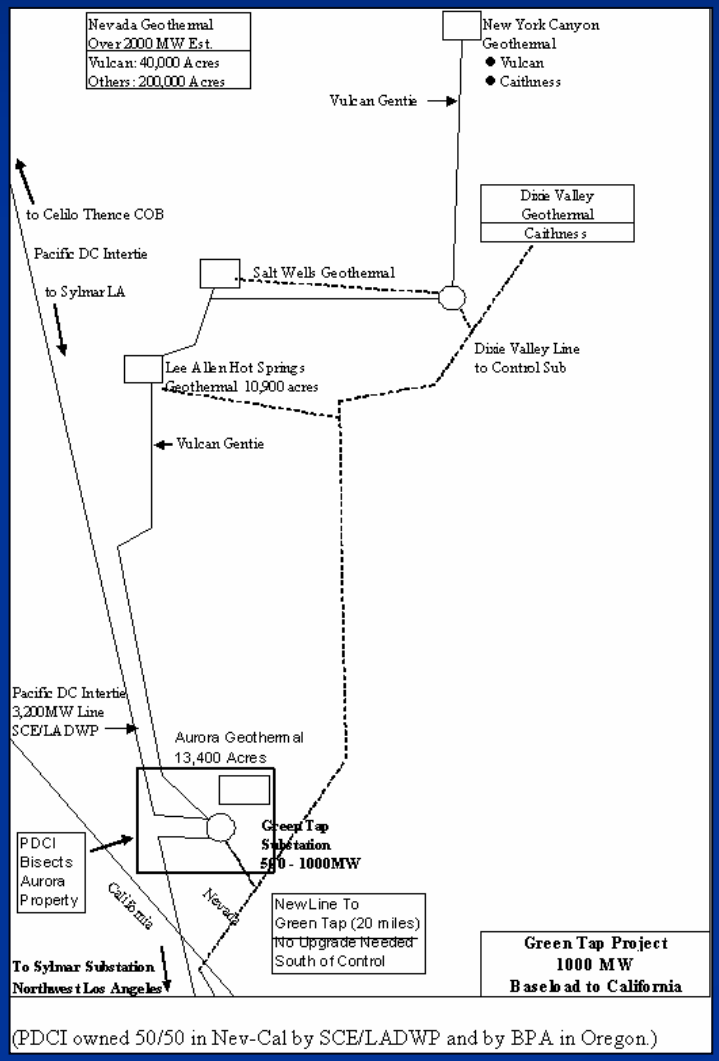
(1) SIS now underway at 60 MW level.

(2) New SIS needed to study stage up.

(3) Compare SIS 2 costs to Phase III.

North of Lugo Project: Phase III (500 to 1,000 MW)
PDCI Aurora Green Tap: Multiple Developers

From: "Electric Transmission Plan for Renewable Resources in California", Dec, 2003



Letter filed with CPUC renewable transmission docket ALJ from DC transmission expert for the PIER funded PDCI study for Munis.

ELECTRANIX

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4 March, 2004 File: A300

Charlotte TerKeurst,
Administrative Law Judge,
California PUC,
505 Van Ness Ave.,
San Francisco, CA 94102

RE: TRANSMISSION CONSTRAINTS DOCUMENT No. 00-11-001
PACIFIC INTERTIE LINE TAP

With reference to the PDCI Green Tap Project of the Vulcan Power Company, there is consideration for development of geothermal electric power generation near La Pine substation in southern Oregon and in western Nevada.

Vulcan proposes connecting to the existing ac transmission system in Oregon, and back-feeding the geothermal energy from near La Pine to the Celilo terminal of the Pacific DC Intertie (PDCI) for transmission to southern California over the PDCI. This is certainly a technical possibility, with the amount of power that could be transmitted subject to study.

The other proposal is to interconnect to the PDCI to deliver geothermal power to southern California from western Nevada. This would convert the PDCI into a three terminal dc transmission line. This too is technically feasible based on the experience of the three terminal, 500 kV dc transmission line that has been operating satisfactorily since 1990 from James Bay in northern Quebec to near Boston.

The purchase cost of adding a 500 MW interconnection to the PDCI is approximately US$ 100 million and for a 1000 MW interconnection would be approximately US$ 150 million in current dollars.

For further information on this matter, please do not hesitate to contact me.

Yours truly,

Dennis Woodford

Dennis Woodford, P.Eng.,
President

CONCLUSIONS:

Letter states: "Green Tap on Aurora property is technically and economically feasible."

Est. Cost: 500 MW @ $ 100 Million which is $210,000 per avg MW

Est. Cost: 1,000 MW @ less than about $160,000 per avg MW

Much Better Than Phase II Lugo and Tehachapi I-III

Aurora Green Tap Project
Pacific DC Intertie Line
North of Lugo Region

500 MW – 620 MW – 1,000 MW New Renewables

From Nevada and Oregon

OR

Sempra Coal Plant Tap on NE California / Nev Border

Why PDCI Renewables Access Is Important To California Now

1.) It is very cost effective, technically feasible and relatively easy to accomplish without environmental-NIMBY ROW opposition. Likely much faster and probably cheaper than any other major renewable transmission constraint removal/upgrade project except COI priority renewable operations loading order.

2.) Vulcan was selected 2 years ago by DWP Renewables Group to supply LADWP with 90 MW of geothermal from Nevada and/or Newberry Volcano, Oregon across the PDCI. But top LADWP managers blocked those RFQ I contracts and RFQ II proposals from being presented for DWP council approval.

3.) Vulcan is of the opinion a new LA mayor (if elected), new DWP council appointees and/or new DWP management will support both RFQ I contracts and some RFQ II proposals including executing Vulcan contracts from its 4 year old RFQ I proposal.

4.) The mayoral challenger is very pro-renewables and said to be over 20 points ahead of current mayor in various polls. This may represent a serious opportunity to clean up the "dirtiest muni in America", as some activists call LADWP.

5.) There is estimated to be over 1,500 MW of quality, clean, low-brine geothermal resources in Nevada of which 500 – 1,000 MW from multiple developers could supply California at modest transmission cost over Aurora PDCI Green Tap project.

Sections 5

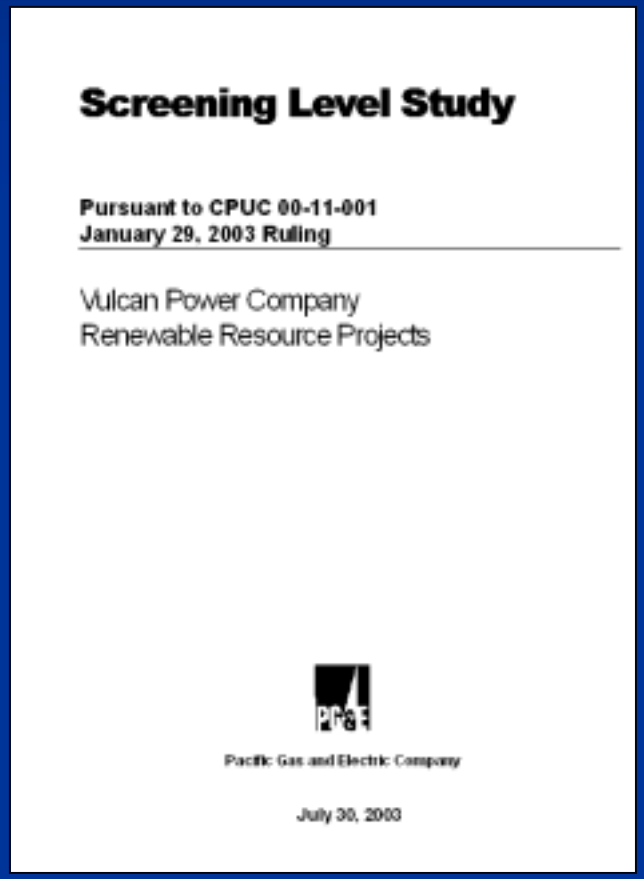
North of Cottonwood Regional Transmission Upgrade Project

Phase I: Mil Pass – Shasta Initial (45 - 60 MW)

Phase II: Mil Pass – Shasta Followon (240 MW)

North of Cottonwood Project
Military Pass – Shasta Project

PG&E Study For
Vulcan (7/30/03)



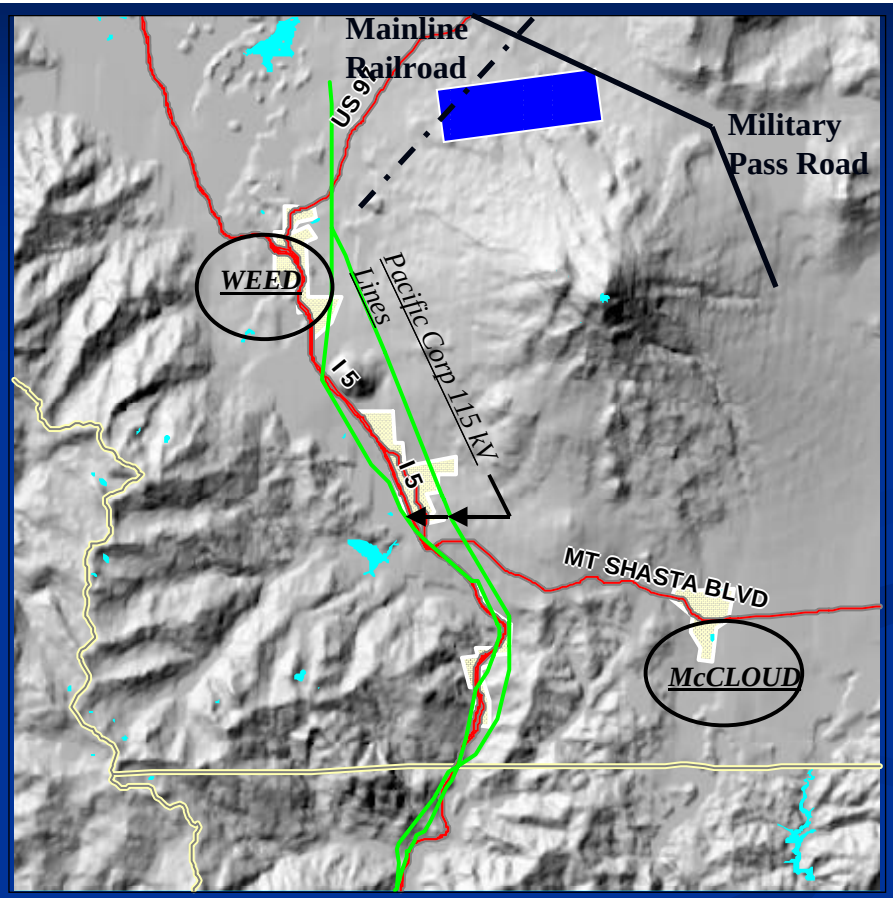
Screening Level Study

Pursuant to CPUC 00-11-001
January 29, 2003 Ruling

Vulcan Power Company
Renewable Resource Projects

Pacific Gas and Electric Company

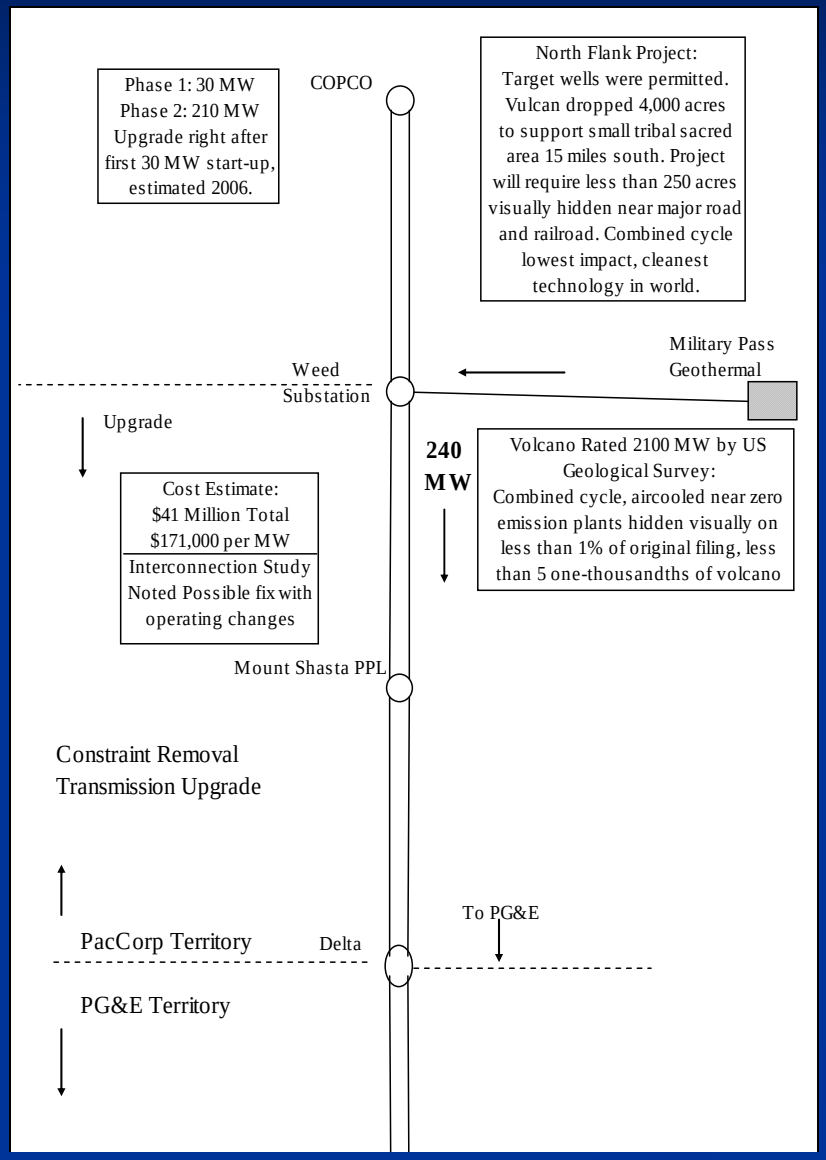
July 30, 2003



This Project will likely have 120 MW PPA executed by Q2-Q3, 2005

General Location Map
Military Pass – Shasta Site
Weed Substation
Two 115 kV lines to South

North of Cottonwood Project
Military Pass – Shasta Project



North of Cottonwood Green Line
Siskiyou and Shasta Counties, California
Transmission Constraint Removal Plan
240 MW Baseload For PG&E Territory

Data Sources: CPUC Transmission Docket PG&E Conceptual Study for Vulcan Power Company and developer project work.

Vulcan Project Diagram From

"Electric Transmission Plan For Renewable Resources In California"

Prepared by the CPUC Energy Division
December 1, 2003

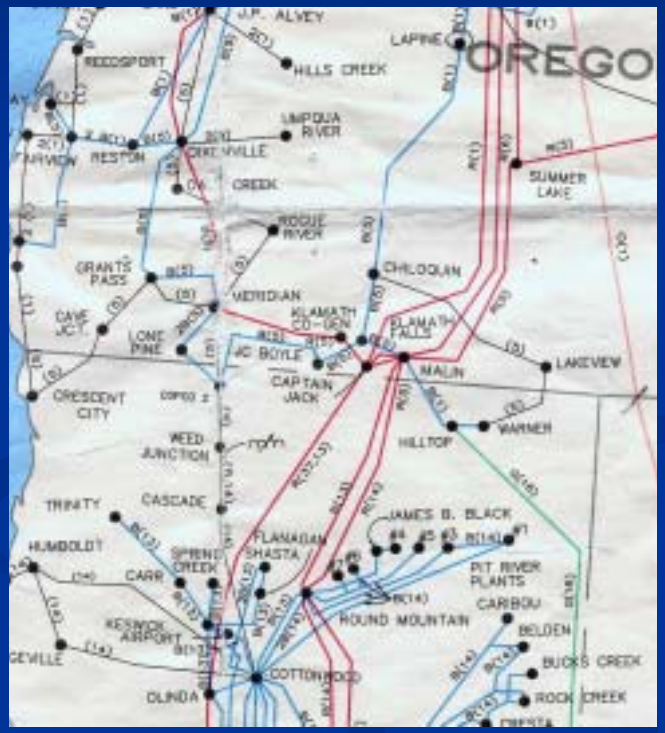
Submitted As Report to Legislature
December 2003 Under CA AB 970

North of Cottonwood Project
Military Pass – Shasta Project

Summary: PG&E Screening Study Results

1. About 45 MW (spring) and 130 MW (summer) could be delivered at Cottonwood without loading Cottonwood 230/115 kV transformer beyond 80% threshold limit.
2. Phase I Cost. About 45 MW under $1 million. Verbal Comments: Detailed SIS may find up to 60 MW capacity at low cost with or without line operating changes.
3. Phase II Cost. 240 MW from Weed sub will require rebuild of 115 kV line and new 230/115 kV transformer at Cottonwood. Line rebuild cost for 75 miles estimated at $41 million, before detailed enviro studies, permits or special geographic costs, circuit breakers, if any.

WSCC Grid: Round Mtn to LaPine, Ore



Phase II Cost if total is $45 million @ 95% capacity, $197,400 per avg MW.

Mil Pass - Shasta Transmission Policy Factor

Vulcan projects will pay 5% of project income for native plant-ecosystem restoration and/or Native American site protection and/or cultural assistance where Vulcan properties are in proven tribal homelands.

North of Cottonwood Project
Transmission Policy Suggestion

Order PacifiCorp to issue CPUC ALJ ordered requests for transmission conceptual studies in California service territory like other IOUs did, or issue new request if not sent to the full service list.

Sections 6

North of Round Mountain/COI Regional Transmission Upgrade Project

Three Projects Using COI

CAISO Boundary Uncertainty

Delivery Point Uncertainty

North of Round Mountain-COI Developers
Vulcan – Calpine – Amp Projects to COI

DEVELOPERS:

Vulcan: Newberry Volcano, Oregon Project to LaPine Sub

1) California Oregon Intertie (South to COI to NP 15)

2) Pacific DC Intertie (North to Celilo to Sylmar/LA SP15)

Calpine: Glass Mountain

1) BPA to COI to Northwest

2) BPA to COI to NP 15 potential

Amps: Surprise Valley (Reportedly PPA with CDWP)(1)

SV COOP to BPA to COI to NP 15

Note: (1) Vulcan believes PPA signed with CDWR. Uncertain if accurate.

ULCAN POWER COMPANY

Newberry Volcano Project, Oregon

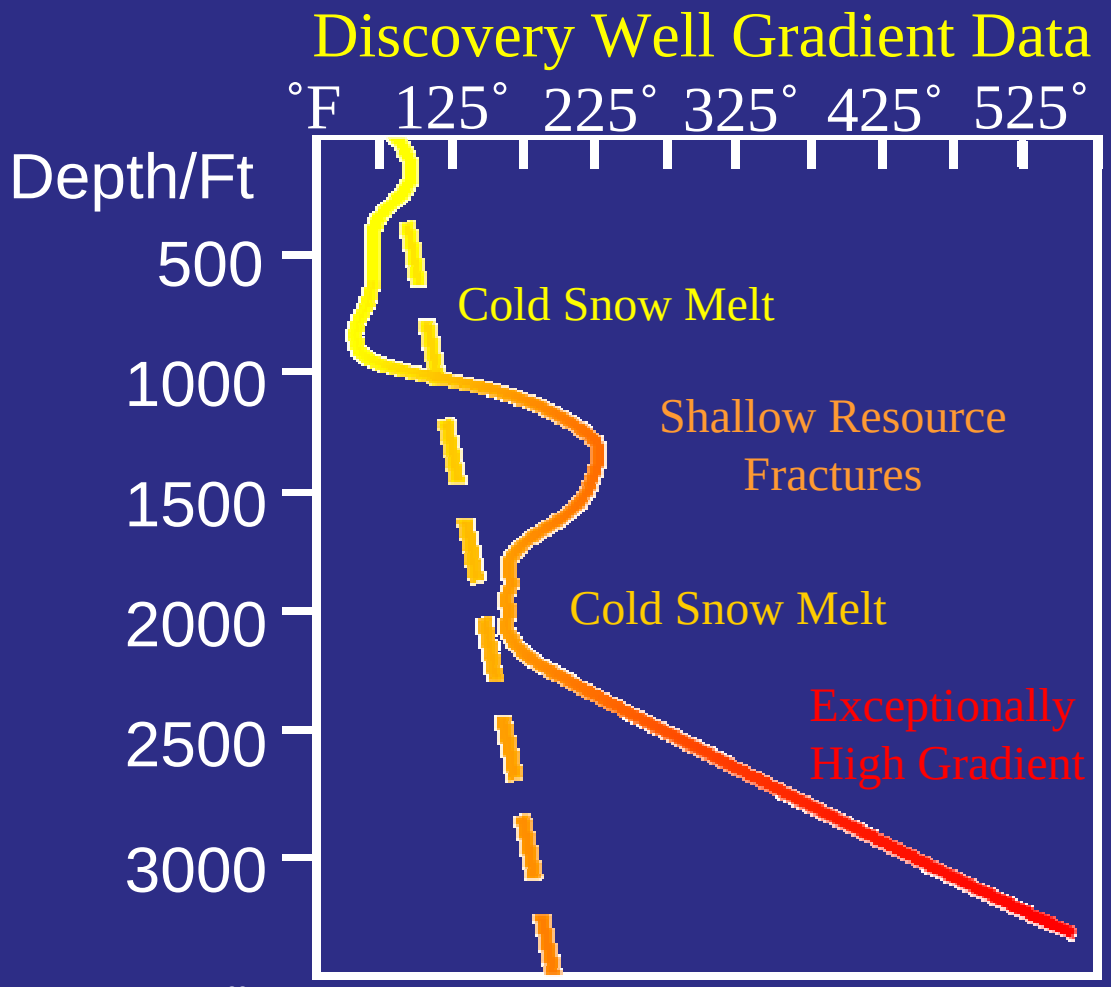
- 40,000 acre joint venture
- USGS Rated: 730 MW
- Steam 509 F - 600 F. Data indicates 10 square mile production zone
- Most advanced major geothermal project in Pacific Northwest

Picture: Vapor from 600 F reported temperature on flanks.

VULCAN POWER COMPANY

Newberry Volcano Discovery Well

Hottest Shallow Steam Well In North America



Typical gradient

Temp. gradient center crater well

Bottom hole temperature 509˚F (265˚C)

North of Round Mountain Project

Calpine Glass Mtn Projects and Vulcan Military Pass-Shasta

Data and picture source:
PowerGen Renewables
Conf. slides 3/05

Mt. Shasta upper mountain viewed from Glass Mountain steam drill rig 30 miles to the east. Both in Siskiyou County, CA.

1. Received Record of Decision from USBLM and USFS.
2. In historic Native American Tribal area. Both near Tribal religious features. Both approved with relatively low cost mitigation.
3. Telephone Flat – 48 MW Project, 3 commercial wells.
4. Four Mile Hill – 49 MW Project, First drilled wells in 2002.

California Oregon Intertie (COI) Transmission Policy Issues

1. If COI is 4,800 MW capacity (north to south), what is appropriate renewable loading order reserve rule:

   a) 10% = 480 MW b) 20% = 960 MW c) 33% = 1,600 MW

2. Should COI renewable loading order reserve be phased to match new RPS/DWP/Muni contracts?

3. Where does CAISO control end in NP 15? Where is delivery point from California and Oregon projects delivering to California utilities:

   a) At COI?

   b) At Cal-Oregon border end of PG&E/Other lines?

   c) At Round Mountain Substation?

4. Which agency can make these policy rules and when?

   CEC-CPUC-CAISO-All three?

Section 7

Transmission Policy Decision Request

Coal Use of PDCI

Renewables Transmission Policy Issue
COAL FIRED versus Geothermal PDCI Use

1. Does California want its utilities (IOU and Munis) to purchase new coal fired power from:

   Sempra 1,450 MW plant on Cal-Nev border and tying up 47 % of PDCI.

2. <u>Consider:</u> The LADWP mayor directed DWP to drop new Utah coal plant project and stopped work on it. Why? Is this Sempra coal plant a DWP mgmt attempt to end-run the Utah coal issue?

Black Story: Proposed Sempra Cal Border Coal Plant

1.) Years ago SPPC looked at PDCI Tap near Reno but project not advanced due to project scale, vibrant NW spill hydro supplies and derating to accomplish terminal repairs.

2.) Some or all repairs made but NW hydro for California much reduced. (See NW Hydro Data Section)

3.) Substantial capacity available on PDCI now. Apparently Sempra thinks 1,450 MW (47%).

4.) Vulcan and Jon Wellinghoff, former Nevada state PUC Consumer Advocate, investigated three years ago and reported to the Nevada legislature potential clean industry growth for Nevada: exporting more geothermal to California via PDCI Tap near its Nev-Cal border crossing.

Black Story: Proposed Sempra Cal Border Coal Plant

5.) Jon Wellinghoff served on LADWP "Renewables Group" panel committee when they had an active RFQ I process. He suggested they seek CEC PIER study funds to evaluate PDCI renewables Tap.

6.) Vulcan has not been able to obtain a final copy of that 3 year old $ 6 million study funded with DOE/California citizen funds. Numerous discussions with CEC staff, copy promised a year ago. Nothing to date.

7.) Where is that study now and what is being done to implement the Renewable Tap project, if anything?

8.) At some point Sempra got wind of the Renewable Tap Project and has tried to get most or all capacity on the line for a new Sempra coal plant adjacent to the California border in NW Nevada. Sempra may or may not plan to sell to LADWP after the outcry over its Utah coal project.

Transmission Policy Issues
Sempra 1,450 MW Coal Plant on Cal-Nev Border:

1. Consider that Nevada PUC/agencies ruled against and killed proposed SPPC 2,000 MW Thousand Springs coal plant to sell coal power to California 15 years ago from NE Nevada. SPPC took $30 million write-off and CEO forced out largely over this issue.

   Plant killed due to air pollution impacts on pristine NE Nevada and Utah-Arizona-Grand Canyon National Parks and water waste, like Sempra plant will ruin California parks and forests and pristine skies.

2. Consider impacts of 20.8 billion lbs/year of new CO2 air pollution into skies of California, Nevada, Oregon, the United States and the world.

3. Consider impacts of 41 million lbs/year of new NOx air pollution into skies of California, Nevada, Oregon, the United States and the world.

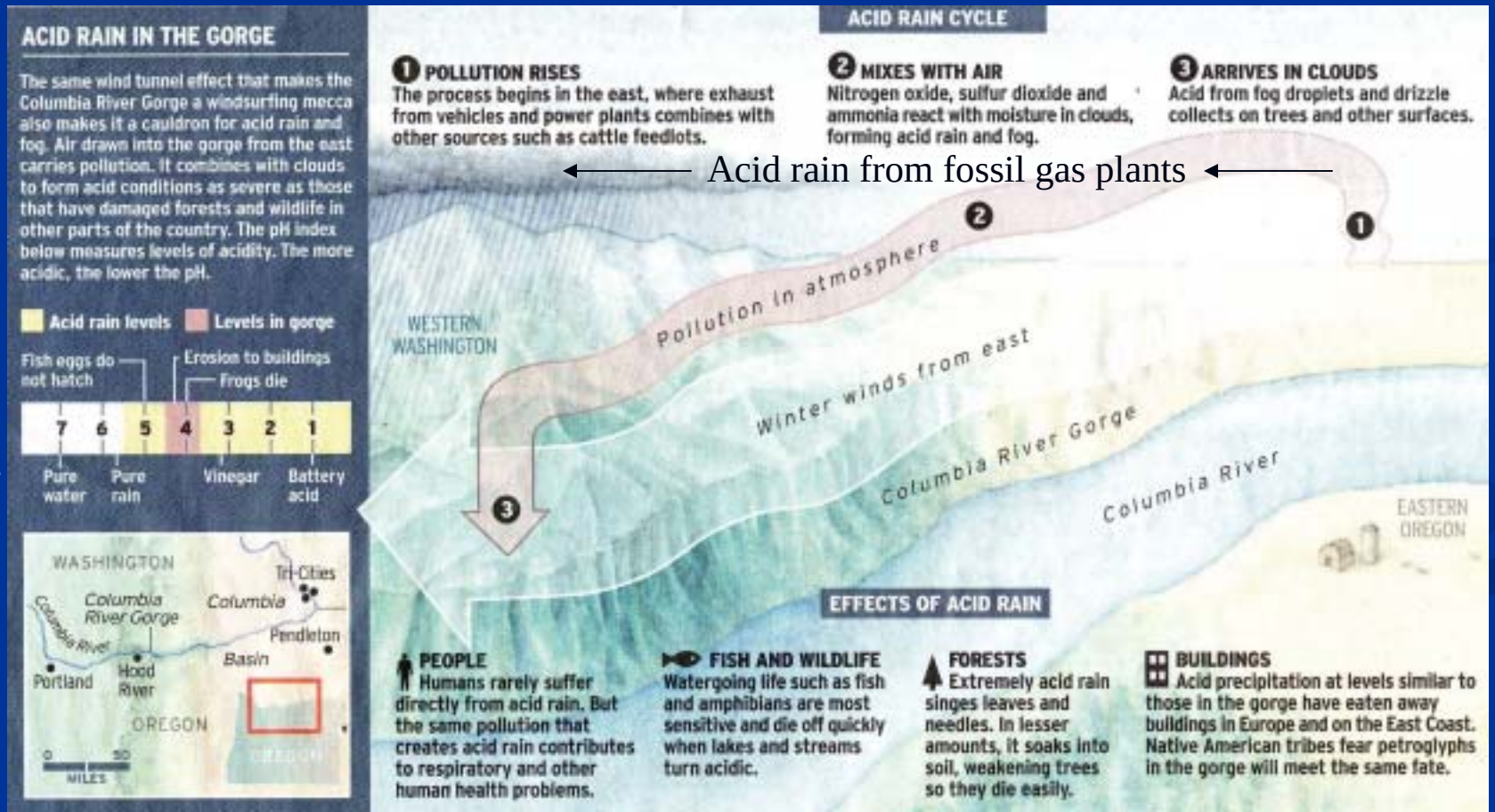
4. Consider impacts of 98 million lbs/year of new SOx air pollution into skies of California, Nevada, Oregon, the United States and the world.

5. Consider impacts of Sempra coal plant demand for 16,000 acre-ft/yr of water in arid Cal-Nev border area. It has launched years-long water adjudication process according to state water engineer pitting local ranchers, Indian tribes, 1 million acre Black Rock NCA public land activists and city of Reno water rights against Sempra plant water demands.

Transmission Policy Issue: Coal Acid Rain

Does California want its northern forests Warner Range/Lassen National Park/Mt. Shasta affected by new coal air pollution acid rain with haze ruining tourist views?

Front Page 4/5/05: “Pristine Oregon” acid rain problem due significantly to eastern Oregon-Washington gas plants!

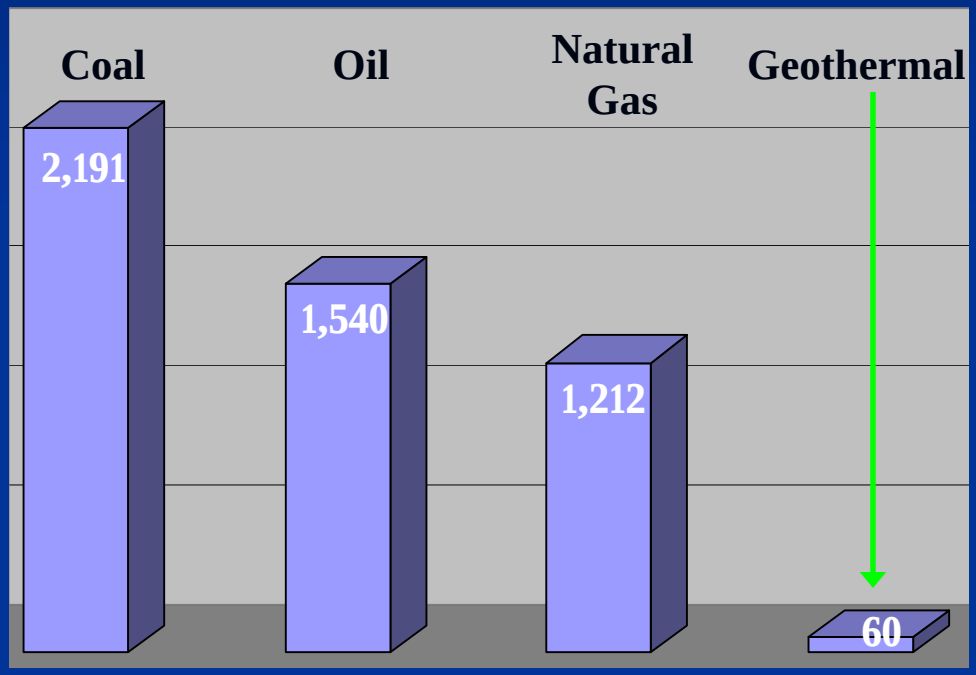


West **East**

Coal Versus Geothermal Transmission Policy Driver

Devote 20% or 33% of 3,100 MW PDCI To Coal or Geothermal ?

CO_2

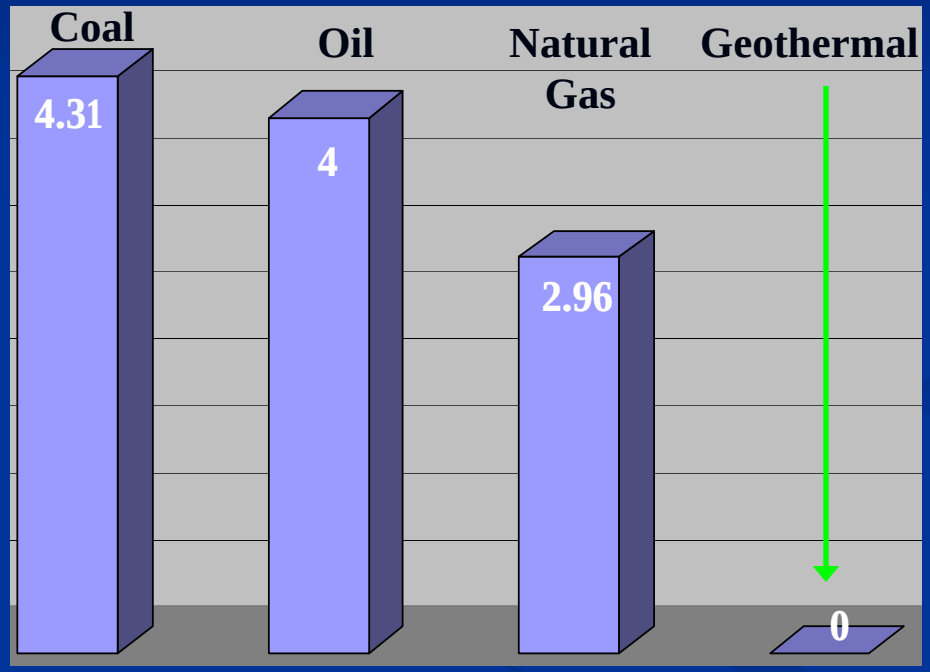


Sempra CA-NV border 1,450 MW coal Plant:

Estimated 20.8 billion lbs/year of CO2 into California-Nevada-US-World skies(1)

(1) Air emission data source: Geothermal Energy Assoc.

NO_x



Sempra CA-NV border 1,450 MW coal Plant:

Estimated 41 million lbs/year of NOx into California-Nevada-US-World skies(1)

(1) Air emission data source: Geothermal Energy Assoc.